21
27. (Amended) A projection exposure apparatus, comprising:

a projection optical system for projecting a transfer pattern of a first object onto a second object;

a first illumination system for illuminating the first object under a first illumination condition, wherein the transfer pattern of the first object illuminated under the first illumination condition is projected onto the second object through said projection optical system;

C1

a second illumination system for providing illumination according to a second illumination condition;

a light intensity detector for detecting a light intensity distribution of an image of a measurement pattern illuminated by said second illumination system under the second illumination condition, the image being formed through said projection optical system; and

an information processing system operable to measure wavefront aberration of said projection optical system on the basis of a result of detection by said light intensity detector;

wherein the first and second illumination conditions have different spatial coherencies.

23 21
29. (New) An apparatus according to Claim 27, wherein the spatial

C2

coherency of the second illumination condition is higher than that of the first illumination condition.

24 21
30. (New) An apparatus according to Claim 27, further comprising a first light source to be used in the first illumination condition and a second light source to be

used in the second illumination condition, wherein the first and second light sources differ from each other.

25 21
31. (New) An apparatus according to Claim 27, wherein said light intensity detector is disposed adjacent an imaging position of the measurement pattern being illuminated under the second illumination condition, wherein said light intensity detector is arranged to detect light intensity distributions at a different positions, being different from each other, and wherein said information processing system is arranged to measure the wavefront aberration of said projection optical system on the basis of the light intensity distributions measured at the different positions.

C2 cont'd

26 25
32. (New) An apparatus according to Claim 31, wherein one of the different positions substantially corresponds to the imaging position of the measurement pattern.

27 21
33. (New) An apparatus according to Claim 27, wherein the transfer pattern and the measurement pattern differ from each other.

28
34. (New) An exposure apparatus, comprising:

an illumination optical system for illuminating a first object and being arranged to provide illumination under a first illumination condition and illumination under a second illumination condition, wherein the first illumination condition includes a first spatial coherency and the second illumination condition includes a second spatial coherency being different from the first spatial coherency;

a projection optical system for projecting a transfer pattern, as illuminated under the first illumination condition, onto a second object;

a light intensity detector for detecting light intensity distributions at different detection positions, being different from each other, with respect to an imaging position of a measurement pattern as illuminated under the second illumination condition, the imaging position being defined by said projection optical system; and

an information processing system for measuring wavefront aberration of said projection optical system on the basis of a result of detection of the light intensity distributions at the different detection positions made through said light intensity detector.

29 28
~~35~~. (New) An apparatus according to Claim ~~34~~, wherein the second spatial coherency under the second illumination condition is higher than the first spatial coherency under the first illumination condition.

30 28
~~36~~. (New) An apparatus according to Claim ~~34~~, further comprising an adjusting unit for adjusting a size of an effective light source of said illumination optical system, as the first and second illumination conditions are to be switched from one to the other.

31 28
~~37~~. (New) An apparatus according to Claim ~~34~~, wherein said illumination optical system includes a stop member, and wherein said stop member is adjusted as the first and second illumination conditions are to be switched from one to the other.

32 31
~~38~~. (New) An apparatus according to Claim ~~37~~, wherein an aperture defined under the first illumination condition is larger than an aperture defined under the second illumination condition.

Cont'd

33 28

39. (New) An apparatus according to Claim 34, further comprising a coherency-transforming optical system which is arranged to be inserted into and/or demounted from said illumination optical system as the first and second illumination conditions are to be switched from one to the other.

34 28

40. (New) An apparatus according to Claim 34, further comprising a first light source to be used in the first illumination condition and a second light source to be used in the second illumination condition, wherein the first and second light sources differ from each other.

35 28

41. (New) An apparatus according to Claim 34, wherein the transfer pattern and the measurement pattern differ from each other.

36 28

42. (New) An apparatus according to Claim 34, wherein the transfer patter and the measurement pattern differ from each other.

37

43. (New) A device manufacturing method, comprising:

a projection exposure step for transferring, by projection exposure, a pattern of a reticle onto a wafer by use of an exposure apparatus as recited in Claim 34; and

a development step for developing the wafer processed by said projection exposure step.

38

44. (New) An exposure apparatus, comprising:

an illumination optical system for illuminating a first object and being arranged to provide illumination under a first illumination condition and illumination under a second illumination condition, wherein the first illumination condition includes a first

spatial coherency and the second illumination condition includes a second spatial coherency being different from the first spatial coherency;

a projection optical system for projecting a transfer pattern, as illuminated under the first illumination condition, onto a second object;

a light intensity detector for detecting an intensity distribution of light directed by said projection optical system to said light intensity detector, from a measurement pattern being illuminated under the second illumination condition;

an information processing system for measuring wavefront aberration of said projection optical system on the basis of a result of detection by said light intensity detector; and

an adjusting unit for adjusting a size of an effective light source of said illumination optical system as the first and second illumination conditions are to be switched from one to the other.

C2 cont'd

39 38
~~45~~. (New) An apparatus according to Claim ~~44~~, wherein the second spatial coherency under the second illumination condition is higher than the first spatial coherency under the first illumination condition.

40 38
~~46~~. (New) An apparatus according to Claim ~~44~~, wherein said adjusting unit includes a stop member having an aperture, and wherein the aperture of said stop member is adjusted as the first and second illumination conditions are to be switched from one to the other.

41 40
~~47~~. (New) An apparatus according to Claim ~~46~~, wherein the aperture defined under the first illumination condition is larger than the aperture defined under the second illumination condition.

42 38

~~48~~. (New) An apparatus according to Claim ~~44~~, further comprising a coherency-transforming optical system which is arranged to be inserted into and/or demounted from said illumination optical system as the first and second illumination conditions are to be switched from one to the other.

43 38

~~49~~. (New) An apparatus according to Claim ~~44~~, further comprising a first light source to be used in the first illumination condition and a second light source to be used in the second illumination condition, wherein the first and second light sources differs from each other.

44 38

~~50~~. (New) An apparatus according to Claim ~~44~~, wherein said light intensity detector is arranged to detect light intensity distributions at different detection positions, being different from each other, with respect to an imaging position of a measurement pattern as illuminated under the second illumination condition, the imaging position being defined by said projection optical system, and wherein said information processing system is arranged to measure the wavefront aberration of said projection optical system on the basis of a result of detection of the light intensity distributions at the different detection positions made through said light intensity detector.

45 38

~~51~~. (New) An apparatus according to Claim ~~44~~, wherein one of the different detection positions substantially corresponds to the imaging position of the measurement pattern.

46 38

~~52~~. (New) An apparatus according to Claim ~~44~~, wherein the transfer pattern and the measurement pattern differ from each other.

47

53. (New) A device manufacturing method, comprising:

a projection exposure step for transferring, by projection exposure, a pattern of a reticle onto a wafer by use of an exposure apparatus as recited in Claim 44, and

a development step for developing the wafer processed by said projection exposure step.

48

54. (New) An exposure apparatus, comprising:

an illumination optical system for illuminating a first object and being arranged to provide illumination under a first illumination condition and illumination under a second illumination condition, wherein said first illumination condition includes a first spatial coherency and said second illumination condition includes a second spatial coherency being different from the first spatial coherency;

a projection optical system for projection a transfer pattern, as illuminated under the first illumination condition, onto a second object;

a light intensity detector for detecting an intensity distribution of light directed by said projection optical system to said light intensity detector, from a measurement pattern being illuminated under the second illumination condition; and

an information processing system for measuring wavefront aberration of said projection optical system on the basis of a result of detection by said light intensity detector;

wherein said illumination optical system includes a coherency-transforming optical system which is arranged to be inserted into and/or demounted from said illumination optical system as the first and second illumination conditions are to be switched from one to the other.

49 48
55. (New) An apparatus according to Claim 54, wherein the second spatial coherency under the second illumination condition is higher than the first spatial coherency under the first illumination condition.

50 48
56. (New) An apparatus according to Claim 54, further comprising an adjusting unit for adjusting a size of an effective light source of said illumination optical system as the first and second illumination conditions are to be switched from one to the other.

51 50
57. (New) An apparatus according to Claim 56, wherein said adjusting unit includes a stop member having an aperture, and wherein the aperture of said stop member is adjusted as the first and second illumination conditions are to be switched from one to the other.

52 51
58. (New) An apparatus according to Claim 57, wherein the aperture defined under the first illumination condition is larger than the aperture defined under the second illumination condition.

53 48
59. (New) An apparatus according to Claim 54, wherein said light intensity detector is arranged to detect light intensity distributions at different detection positions, being different from each other, with respect to an imaging position of a measurement pattern as illuminated under the second illumination condition, the imaging position being defined by said projection optical system, and wherein said information processing system is arranged to measure the wavefront aberration of said projection optical system on the basis of a result of detection of the light intensity distributions at the different detection positions made through said light intensity detector.

54 53
60. (New) An apparatus according to Claim 59, wherein one of the different detection positions substantially corresponds to the imaging position of the measurement pattern.

55 48
61. (New) An apparatus according to Claim 54, wherein the transfer pattern and the measurement pattern differ from each other.

C2 cont'd

56
62. (New) A device manufacturing method, comprising:

a projection exposure step for transferring, by projection exposure, a pattern of a reticle onto a wafer by use of an exposure apparatus as recited in Claim 54; and

a development step for developing the wafer processed by said projection exposure step.